

REMARKS

Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Upon entry of the foregoing amendments, claims 1-4, 6-9 and 12-24 will pending.

Claim 1 is amended to emphasize that the curable resin compositions according to embodiments of the invention under consideration are useful as molding compositions or structural resins, namely, for forming molded parts or structural materials, *i.e.*, materials having thicknesses of at least one millimeter. In addition, for the purpose of further clarity, claim 1 explains that the unsaturated prepolymer has an average molecular weight from 250 to 5000 (*see, e.g.*, page 4, lines 26-27). Independent claim 9 is amended similarly to claim 1.

Applicants note with appreciation that the previous grounds for rejection are withdrawn. It is respectfully submitted, however, that the newly cited prior art would not have presented to the practitioner of ordinary skill in the art information which would have suggested or led to the subject matter being claimed herein. Accordingly, it is respectfully submitted that, for the reasons set forth below, the present application is in condition for allowance.

Reconsideration and withdrawal of the rejection of claims 1-4, 7-9 and 12-24 as unpatentably obvious over Guzauskas U.S. 6,103,779 (hereafter US 779) is respectfully requested for at least the following reasons.

As noted from the Abstract, as well as the specification, the disclosure of US 779 relates to fiber reinforced thermosetting bulk molding compounds (BMC) [dispensed as premixed doughs] and sheet molding compounds (SMC) [provided as sheets] useful in the field of dentistry or other applications where small amounts of the compositions are used occasionally. Accordingly, long shelf life, low pressure, low temperature curability and moldability are required (*see, e.g.*, column 4, lines 17-29; column 8, line 65 to column 9, line 4). The compositions of interest are based on curable liquid monomers reinforced with long fibers. The patentees provide a solution to the problems encountered in the prior art wherein thickening occurs by a physical process rather than a chemical process (*see, e.g.*, column 5, lines 8-11).

In particular, the BMCs and SMCs of Guzauskas are based on incorporation of solid particulate amorphous/non-crystalline acrylic resin thickener which permits fiber reinforcement and other additives to be incorporated easily (*see, e.g.*, column 1, lines 14-18).

More generally, the molding compositions of US 779 include: a) liquid monomer, oligomer, polymer or combination thereof containing vinyl unsaturation; b) at least 35 wt%, based on a), of a solid acrylic resin which is soluble in a), has a certain average particle size (0.005 mm to 0.5 mm), with at least a portion of a) being absorbed therein (the solid acrylic resin reacts with a) absorbed therein in the presence of an activated free-radical polymerization initiator); c) at least 10 wt% of long fiber reinforcement of specified dimensions and which is insoluble in b); and d) free-radical polymerization initiator, inactive at ambient temperature (see column 7, lines 38-67).

From the disclosure in column 11, lines 42-60, the liquid monomers, oligomers and polymers include liquid acrylic monomers, liquid oligomers (diacrylates and dimethacrylates) and polymers therefrom. Others include liquid bis-GMA oligomers and polymers, liquid carboxylated acrylates, liquid carboxylated methacrylates, liquid styrene monomers (which may be substituted) and oligomers.

The solid acrylic resin is used in the form of beads (column 7, lines 14-15) and are “of a molecular weight, chemical composition and large bead diameter as a means to be both slowly dissolving in and highly absorbing of the polymerizable monomer, oligomer or polymer solvent.” (Column 7, lines 20-23.) The disclosure of US 779 at column 9, lines 31-41, explains that a representative acrylic resin thickener has a molecular weight of about 400,000. The broader disclosure at column 12, lines 1-8, is that the molecular weight is above 100,000, most preferably above 400,000.

Accordingly, from this disclosure, curable resin compositions comprising an unsaturated prepolymer which has an average molecular weight from 250 to 5000 are not described or suggested.

For this reason alone, withdrawal of the rejection based on the disclosure of US 779 is respectfully requested.

In addition, at column 12 of US 779, the patentees disclose that the compositions according to the invention can include other solid or liquid resins which will or will not participate in the free-radical polymerization; the latter case including, *e.g.*, fillers or other additives. As examples of the reactive “other solid or liquid resins” mention is made of polyesters and those derived from various monomers including, *e.g.*, vinyl ethers, acrylonitrile, styrene, propylene, vinyl acetate, vinyl alcohol, vinyl chloride, vinylidene chloride, butadiene, isobutylene, isoprene, divinylbenzene and mixtures thereof. The

disclosure in column 12 would not have suggested a curable resin composition as claimed herein wherein a vinyl ether of formula (I) or formula (II) is used for crosslinking with an unsaturated prepolymer.

The rejection refers to the specification at column 22, lines 9-32 (claim 1) as generally disclosing the liquid monomers and then refers to the disclosure at claim 9 and columns 22-23 as mentioning vinyl ethers as the liquid monomers. However, as noted above, the listing of liquid monomers in claim 9 is apparently based on the aforementioned disclosure at column 12, lines 52-55 (which is the ONLY disclosure in the specification of US 779 mentioning vinyl ethers) which relates to "other solid or liquid resins." The liquid monomers used as the component (i) of claim 1 are those described in claim 8 and these do not include the vinyl ethers. Therefore, when the disclosure of US 779 is considered in its entirety, the practitioner would not have been led to a curable resin composition where a vinyl ether monomer is used for the purpose of crosslinking with an unsaturated prepolymer.

Moreover, as shown in the examples and comparative examples in the specification of this application, the selection of a vinyl ether, as compared to other liquid monomers mentioned at column 12, lines 52-55 and claims 8 and/or 9, does provide different and unexpected results. For instance, Comparative Example 1A (see pages 16-17) used styrene monomer in place of the vinyl ether monomers used in Examples 1.1 and 1.2. Substantial reductions in gelling time at 23 °C are achieved with the vinyl ether monomers. Looking at Comparative Example 2B, and Comparative Examples 3A and 3B (Table on page 21) wherein hydroxypropylmethacrylate (HPMA) is used in place of vinyl ether monomers, the surface of the cured resin is much improved in the examples according to the invention and, in addition, the conversion, α , is also substantially higher. The results in the Table on page 23 show that replacing these and other monomers within the disclosure of US 779 with a vinyl ether results in other significant improvements including gel times, exothermal times and exothermal peak temperatures.

These results provide further evidence that the embodiments of the present invention being claimed herein would not have been obvious in view of US 779.

For all of these reasons it is respectfully submitted that the subject matters of claims 1-4, 7-9 and 12-24, would not have been obvious in light of US 779 and, therefore, withdrawal of this rejection is respectfully requested.

Reconsideration and withdrawal of the rejection of claims 1-4, 6-9 and 12-24 as unpatentably obvious over Friedlander, U.S. 6,054,502 (hereafter "US 502") is respectfully requested for at least the following reasons.

According to the rejection the only difference between the claims under rejection and the disclosure of US 502 is the absence of an example using vinyl ester urethane resin obtained by reaction of isocyanate, a polyol and a hydroxyl-terminated (meth)acrylate. However, these resins are considered to be described in or obvious from the disclosure at column 4, lines 10 and 44-45.

Applicants respectfully disagree.

The disclosure at column 4, line 10 merely refers to an embodiment wherein a half-capped diisocyanate can be reacted with hydroxyl functionality provided by an unsaturated polyol (for example, prepared by reacting an unsaturated carboxylic acid or anhydride with excess polyol). The disclosure at lines 44-45, on the other hand, does not exemplify monomers relevant to the embodiment discussed on line 10, but merely refers to other ethylenically unsaturated monomers or oligomers which may be included in the liquid radiation curable compositions of the invention.

Accordingly, it is respectfully submitted that a fair reading of the disclosure of US 502, in the absence of Applicants' own disclosure, would not have led the practitioner to the conclusion that vinyl ester urethane resins are within the disclosure of US 502.

The rejection also refers to claim 8 in column 10 as disclosing that the unsaturated polyester may be an unsaturated polyester-urethane polymer. This may be true but does not suggest a vinyl ester urethane resin or methacrylate urethane resin. In view of the disclosure at column 2, lines 24-49, which exemplifies the ethylenically unsaturated carboxylic acids which may be used for preparing the unsaturated polyesters for the compositions according to the invention, no mention is made of (meth)acrylic acids or methacrylates. It is only dicarboxylic acids and polycarboxylic acids which are described. Therefore, the practitioner having the entire disclosure of the reference and not merely the isolated words in claim 8, would not understand that vinyl ester resins or vinyl ester urethane resins are described in or contemplated by US 502.

Accordingly, for this reason alone, reconsideration of this rejection is respectfully requested.

It is further noted that the radiation curable compositions of US 502 are disclosed only as coating compositions for curing on a substrate (*see, e.g.*, column 1, lines 35 to 63; column 6, lines 36-45 and examples). There is no disclosure or suggestion of compositions effective for use as a molding or structural resin composition. Nor is there any disclosure of a method for production of a molded part or structural material as in claims 15-20, or of flooring materials, roofing materials or rock bolt materials, as in claims 22-24. These structures are further characterized by having a thickness of at least 1 millimeter which would not be expected in a cured coating composition.

Accordingly, the claims are patentable over US 502 for these additional reasons.


In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Please charge any fees associated with the submission of this paper to Deposit Account Number 03-3975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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